Report for 2003NY33G: An Assessment of New Advances in Low Streamflow Estimation and Characterization

- Other Publications:
    - Zhang, Z, and C N Kroll, 2005, Estimation of low streamflow statistics at ungauged sites using baseflow correlation, American Geophysical Union conference, New Orleans, LA; Spring 2005.
    - Hirabayashi, S, C N Kroll, 2005, Developing a geospatial data model to derive watershed characteristics for low streamflow prediction, American Geophysical Union conference, New Orleans, LA, Spring 2005.

Report Follows

Title: An Assessment of New Advances in Low Streamflow Estimation and Characterization

Principal findings or significant results:
Research on this project began in May 2005. During the last year we have been working primarily on three issues:
- validity of the assumptions of the baseflow correlation technique (bfc),
- experimental design of a jackknife simulation used to assess the bfc, and
- development of GIS tools to automate the generation of regional watershed characteristics from digital information.

The bfc is an information transfer technique, where a nominal number of baseflow measurements are obtained at an ungauged river site, and then correlated with flows from a nearby gauged site. Using this information, low streamflow statistics can be estimated. We have develop new results which allow the user to understand the impact of gathering more streamflow measurements as well as the strength of the correlation between the flows. This information is crucial to users, as it provides a set of guidelines to understand how to employ the bfc in practice. We have also developed a better understanding of the impact of performance metrics on the assessment of the bfc.

Notable Achievements:
A extremely notable achievement is the development of a GIS tool to automate the regional development of watershed characteristics. Currently there is an abundance of meteorologic, geologic, topographic, and land use information available in digital formats. When one has only a small number of grids, calculating characteristics at numerous watershed in a region is a time consuming but obtainable task. When the number of grids is in the thousands, the time and effort required to process this information on a regional level is tremendous. Within an ArcGIS environment, we have develop new GIS tools to completely automate this procedure. Not only does this reduce the time to process this information, but it also helps avoid human error that can occur from manually processing this information. The information derived will be employed in regional regression models of low streamflow statistics within our study regions. As many researchers throughout the world require the development of databases of environmental information on a watershed scale, we envision a wide audience that will benefit from the availability of this new GIS tool.

Students supported:
During the last year, 1 PhD student has been supported full-time on this project. In addition, 1 PhD student and 1 MS student have received summer support from this project.